Apr 2, 82
5230.9 (Encl 2)

CLEARANCE REQUEST FOR PUBLIC RELEASE OF DEPARTMENT OF DEFENSE INFORMATION

TO: Assistant Secretary of Defense (Public Affairs)

ATTN: Director, Freedom of Information & Security Review, Rm. 2C757, Pentagon

1

SEE INSTRUCTIONS ON REVERSE

This form is to be used in requesting review and clearance of DoD information proposed for public release in accordance with DoDD 5230.9.

1. DOCUMENT DESCRIPTION

a. TYPE	b. TITLE
Technical Report	Development of Installation Weapon System Cost Factors
c. PAGE COUNT: 27	d. SUBJECT AREA: O & S Cost Estimating

2. AUTHOR/SPEAKER

a. NAME (Last, First, MI)	b. RANK	c. TITLE
West, Richard M., Jr.	GS-11	Installtion Cost Factors
	e. OFFICE: AFZF-RM-B	f. AGENCY: U.S. Army

3. PRESENTATION/PUBLICATION DATA

See attached report.

4. POINT OF CONTACT	5. PRIOR COORDINATION
a. NAME (Last, First, MI): West, Richard M., Jr.	a. OFFICE: AFZF-RM-B, Fort Hood, Texas 76544
b. TELEPHONE NUMBER (Include Area Code): 817-287-9453 AV 737-9453	b. AGENCY: U. S. Army

6. REMARKS

7. RECOMMENDATION OF SUBMITTING OFFICE/AGENCY

a. The attached material has Department/Office/Agency approval for public release (qualifications if any, are indicated in Remarks Section) and clearance for open publication is recommended under provisions of DoDD 5230.9. I am authorized to make this recommendation for release on behalf of:

Chief of Staff, III Corps and Fort Hood

b. Clearance is requested by 890906 (YYMMDD).

c. NAME (Last, First, MI)	d. TITLE	e. SIGNATURE
Bikoski, Robert R.	Acting Director of Resource Management	Robert R. Bikoski
f. OFFICE: III Corps and Fort Hood	g. AGENCY: U.S. Army	h. DATE (YYMMDD): 28 July 1989

DD FORM 82 MAR 1910 PREVIOUS EDITION IS OBSOLETE.

Report AFZF-RM-B-8909001

DEVELOPMENT OF INSTALLATION WEAPON SYSTEM COST FACTORS

Quality cost factor development is dependent upon correct data assessment, repair part inventory dynamics, and proper resource allocation.

Richard M. West, Jr., Program Analyst, GS-11
III Corps and Fort Hood
AFZF-RM-B
Fort Hood, Texas 76544
(817)-287-9453, AV 737-9453

Dir of Resource Management

1 July 1989

Report for 23rd Annual DOD Cost Analysis Symposium, 6 - 8 September 1989

Prepared for

ADODCAS
Naval Center for Cost Analysis
Pentagon, Rm 4A538
Washington, DC 20350-1100

III CORPS AND FORT HOOD
AFZF-RM
Fort Hood, Texas 76544

Table of Contents

Development of Installation Weapon System Cost Factors

Richard M. West, Jr., U.S. Army, Fort Hood, Texas

Introduction

Efficient managers seek ways to quantify the real world in an effort to predict, model, and/or 'War Game' scenarios to assess risks involved in day-to-day decision making. With the advent of computers, these models are becoming increasingly popular and easier to develop not only in the model themselves but also in data collection and analysis.

One simple method to predict costs is through the use of cost factors, specifically weapon system cost factors. The Air Force and Navy, at the macro level, use cost factors to predict flying hour and steam-hour costs respectively in preparing department budget programs for Congress. Historically, this has been difficult for the Army in that their mission cost driver could not be linked to any such large inanimate entities. Such main weapon systems are not found in the Army.

In an effort to more accurately quantize training and associated costs, the Department of the Army has approved the fielding of the Events Resourcing Model (ERM)[1]. This system can calculate projected costs of training events based upon projected equipment usage estimates by weapon system and established cost factors. Usage estimates for the ERM are not too difficult to predict. Historic data can be used. However, weapon system cost factors can be more dynamic in nature. They change due to weapon system age and/or repair part price changes. For this system to be reliable, accurate weapon system cost factors must be developed and maintained.

In order to understand how this system can work for the Army, it is necessary to understand the Army training philosophy. Each unit in the Army is assigned a primary mission. This dictates how the unit will train for any particular year. The mission is based upon the assessment of existing threats to the United States. Each main mission is divided into sub-missions with logical beginning and ending points. Furthermore, these sub-missions are divided into even more discrete tasks. This progression continues down to the soldier level. Each training event, whether it be a Corps level exercise or individual M16 weapons training, is designed to develop the necessary skills to accomplish the total Army mission.

For example, the current III Corps (Fort Hood) main mission is to defend Europe against possible Warsaw Pact aggression. To be able to execute this mission, Fort Hood units must be able to 1) mobilize by loading personnel and non-prepositioned equipment, 2) relocate to a predetermined area in Europe, 3) requisition prepositioned equipment, 4) road march to an assembly point, 5) establish communication and logistics systems, 6) road march to the point of conflict, and then 7) engage in battle.

The Army performs Corps, Division, Brigade, Battalion, Company, Platoon, and individual level exercises that are designed to emulate expected conditions and situations predicted for each mission. III Corps conducts several of these exercises each year to simulate each phase and skill level of the above scenario. For example, Fort Hood conducts the exercise code named 'Road Runner' each year to simulate items 4, 5, and 6 above.[2]

Each training event that is conducted is evaluated by command personnel to rate the performance by the unit to execute the exercise. Performances are then used to calculate a unit readiness status in the various skills the event was to develop and test. Such planned exercises can be quantified using equipment usage estimates and weapon system cost factors thus creating a mechanism to predict costs and required budgets to obtain definable readiness levels.

The purpose of this paper is threefold. It is to provide some guidance to installations on how to develop, implement, analyze, and maintain a good local cost factor program. Secondly, it is to establish credibility within the Department of Defense as to the accuracy and limitations of reported cost factors. Lastly, it is to lend credence to the effort by the Army to improve its budget programing in the Program Objective Memorandum (POM) cycle.

Weapon System Cost Factor

A cost factor, in the broadest sense, is a number that can be used to estimate a quantity based upon some predetermined relationship. In this case, the weapon system cost factor is a ratio relationship between system sustainment costs and usage. Usage may be expressed either in mileage or hours. The numerator can be calculated using either engineered failure rates of system parts for new weapon systems or actual repair part costs for fielded systems. This paper will discuss only repair part cost when developing the numerator. Petroleum, Oils, and Lubricants (POL) will also be considered in the numerator. The denominator is dependent upon the type of weapon system. Mileage is normally the preferred unit of usage measurement. However, hours is more meaningful in the case of generators, material handling equipment (MHE), and helicopters.

In order to discuss how these factors can be generated , it is necessary to define what will comprise an equipment cost factor. This definition is dependent upon what organizational level that these factors will be used. For the sake of brevity and installation application, an equipment cost factor will consist of three basic cost elements; POL, unit level maintenance, and the direct support (DS) maintenance. Unit level maintenance is maintenance provided by battalion maintenance such as filter changes, track replacement, or other 'light' maintenance level authorized to be performed by unit mechanics. Direct support maintenance is a higher level maintenance that usually involves weapon sub-systems and can generally be classified as some overhaul work and/or speciality maintenance.

Therefore, the cost factor will be defined as:

$$CF_i = CF_{Pol} + CF_{Unit} + CF_{DS} \qquad \text{Eq. 1}$$

where CF_i is the installation cost factor, CF_{Pol} is the POL cost factor, CF_{Unit} is the Unit maintenance cost factor, and CF_{DS} is the DS maintenance cost factor. The POL cost factor is defined as:

$$CF_{Pol} = \text{Fuel Cons. (Gal) X Fuel Cost (\$/Gal)/Usage} \qquad \text{Eq. 2}$$

The Unit maintenance cost factor is defined as:

$$CF_{Unit} = \text{Unit Repair Part Costs (\$)/ Usage} \qquad \text{Eq. 3}$$

The Direct Support maintenance cost factor is defined as:

$$CF_{DS} = \text{Direct Support Repair Part Costs (\$)/ Usage} \qquad \text{Eq. 4}$$

The higher one goes in the Army command structure, the more components must be added to this factor, CF_i, to more accurately capture the cost for any particular weapon system. For example, if Forces Command (FORSCOM), in the case of Fort Hood, wanted to know the cost to operate the M1 Abrams tank, it must also consider the affect this system has on the base operations logistic maintenance activity, Directorate of Logistics (DOL).

Reporting System

In order to create an accurate cost factor, a reliable data reporting system must either be utilized or created. This is not only true for the numerator but also the denominator in equations 2 through 4 above. Both require constant monitoring and maintenance of input and output to obtain both consistency and quality. This investment can be easily overlooked by analysts unfamiliar with the day-to-day operations of a motor pool.

Before a reporting system can be designed and implemented, the analyst must decide when and how often data is to be reported. Sometimes this can be dictated by the unit commanders. Nevertheless, experience has shown that a monthly report cycle is preferred. It provides the analyst with a report status check, it coincides with the monthly cost data reporting cycle, and it is frequent enough for the motor pool report clerks not to forget the reporting requirement.

Repair part costs can be obtained from several sources. Some are 1) the Tactical Unit Financial Management Information System (TUFMIS), 2) the official unit obligation record, Standard Army Financial System (STANFINS), or 3) the Central Demand Database (CDDB). There are advantages and disadvantages for using each one of these data sources. Ideally, use of all three data sources would be best as a cross-check, but the time to perform such an in-depth analysis is not always available.

The TUFMIS AVE-52A, Weapon System Cost Report[3], is the most convenient system. Although it is the unit commitment system and may not be as accurate as the CDDB or STANFINS, it does provide the analyst with readily available monthly data by Unit Identification Code (UIC) and by End Item Code (EIC). The other systems do not provide costs at such detail. Caution should be exercised however, when using TUFMIS data. Although cost data is reported by EIC, the EIC code placed on the requisition is not checked for validity during the requisition editing process, i.e. incorrect EIC codes can be pass through the system undetected.

The CDDB is also a good choice for the analyst. This data is collected and maintained by the Logistics Control Activity (LCA) in California. It contains off-post repair part demands. This not only includes unauthorized stockage items but also replenishment demands for authorized stockage items. Although it may be more accurate than the TUFMIS report, it provides repair part data only by the UIC and National Stock Number (NSN) which may or may not be linked to a particular weapon system for such common parts as batteries, filters, etc. However, there is a mathematical resolution to this problem.

The CDDB is not an equal substitute for the TUFMIS report. Although, it provides repair part data by UIC, the months associated with the data are not necessarily the months that the cost were incurred, because costs reflected in this file are demands on the supply system needed to either fill depleted authorized stock or unauthorized stockage demands.

Although STANFINS data is the most accurate in that it reflects actual monthly costs, it is the least desirable. It does not provide sufficient detail required to develop factors by weapon system. The file however can be used as a cross-check to the accuracy of current cost factors by comparing total unit maintenance dollars spent in any fiscal year to TUFMIS commitments or CDDB repair part demands.

POL usage and vehicle usage data can be obtained from unit dispatch logs. However, there is no standard Army system that requires the reporting of usage data except for aircraft. Therefore, the analyst must either go to the motor pool dispatch points and physically collect the data from the vehicle dispatch logs or create a usage reporting system to obtain this data. The latter is obviously preferred. However, it requires monthly maintenance to ensure that data is being reported and that it is accurate. Individual training of new clerks responsible for the report may be required every month due to the high turnover rate of these positions.

Data Collection

Again, two sets of data must be collected to formulate the cost factor, CF_i. The weapon system cost data and the corresponding usage data. Prior to the popularity of the PC, usage data had to be collected using some local form in which the unit listed the equipment by EIC and nomenclature along with the current odometer reading, chronometer reading, and POL usage. However, this collection system has been automated.

The personal computer (PC) can improve the accuracy of usage data reporting by reducing number transcription errors, providing edit checks for entered data, and by making it easier for the clerk to provide the monthly usage data report. Such a system is in use at Fort Hood by all division motor pools. It was initially written by Management Consulting & Research, Inc., and christened the Equipment Usage Data Collection System (EUDCS)[4]. EUDCS was fielded at Fort Hood and used for approximately six months. The original program has since been revised by the author to contain more user functions and on-line help screens . Data is sent monthly to the analyst via floppy disks. It should be noted that monthly data reporting has improved dramatically since the fielding of the revised EUDCS system not only in the timeliness of the reporting but also in the quality of the usage data.

TUFMIS data is collected from the unit's Financial Management Office (FMO). They are responsible for the TUFMIS system which is run on the DS4/DAS3, Direct Support Unit Standard Supply System/Decentralized Automated Service Support System. Upon request, system personnel can run the standard TUFMIS report, AVE-52A on a monthly basis, if this report is not already produced. The report is a cumulative monthly report listing unit commitments by End Item Code (EIC) and Unit Identification Code (UIC).

If the AVE-52A cannot be obtained, then the CDDB file should be used. Arrangements can be made with LCA to furnish this file to the installation at prearranged dates. A frequency of twice a year is sufficient to allow the analyst to conduct a semiannual status check of the data and to prevent an unnecessary administrative burden to the LCA. The tape extract can be sent in most 9 track computer tape formats thus allowing the analyst to load the data into file formats used by local mainframe software/hardware. The data can be queried, totaled, or listed to obtain repair part dollars. With the appropriate software/hardware, a computer literate and enterprising analyst can download this information into a personal computer file format structure that is easier and faster to manipulate.

Although reporting requirements can be established, it does not mean that it is automatic. Normally, usage data reporting by the units is slow and low in priority. It is a function of command emphasis. To maintain command visibility, it may be necessary to enlist the garrison commander's support periodically by publishing a Memorandum of Instruction.[5]

Data Trends

Before one can properly analyze the collected data, the analyst must understand the cyclical nature of equipment cost factor data. This can be best understood for any unit if a training calendar is available for that unit. Use of a unit's training calendar will reveal the approximate times to expect higher usage rates. Although there are exceptions, a unit is either training, or they are recovering from a previous exercise. Recovery is defined as conducting maintenance on equipment to restore that equipment to Army standards[6].

An important factor is now introduced, maintenance lag, T_{Lag}. This is defined as the length of time between the month of incurred usage and the maintenance dollars that are associated with that usage, see Figure 1. This can only be determined when using TUFMIS commitment data, because the CDDB does not contain meaningful dates since it is based upon off post demands which can occur up to six months after the repair part was actually used. The T_{Lag} will be used in calculating unassigned maintenance dollars for both the CF_{Unit} and the CF_{DS}. T_{Lag} can be anywhere from one to three months from the actual time the usage occurred. It can be calculated for each unit by plotting equipment usage and repair part commitments and determining the length of time between a high usage month and an adjacent high cost month. The determination of T_{Lag} is not necessarily mathematical but rather empirical.

Another anomaly with weapon systems is associated with the the availabil y of money for repair parts. This is dependent on how a unit is nded in any particular year. If money is in supply, stockage levels are maintained. Yet, if money is scarce, units are forced to allow their stockage levels to decrease. This situation has the affect of lowering the cost factor for the reporting period when in fact the equipment is 'borrowing' money from a previous fiscal year or reporting period that had more money available for repair parts.

The opposite is true when in a new fiscal year, money is more available for repair parts than the previous fiscal year. This creates a supply 'bubble' and drives cost factors higher for the reporting period than what they actually are.

Year end buying can also create havoc to generated cost factors. Normally appropriated money is spent at a consistent rate throughout the fiscal year. However, most activities reserve a small percentage of that money as a contingency in case of an emergency. When the fiscal year is about to close, the unused contingency money is pooled by the installation resource manager to buy unfinanced requirements to avoid losing the use of the money at year end. One of the highest priorities in year end 'shopping' is replenishment of repair parts for depleted inventories. When approved and purchased, year end buys cause cost factors to be higher for that reporting period. The analyst should expect the cost factors to fluctuate between reporting periods.

Data Analysis

As in any quality analysis, the raw data must be reviewed to determine whether or not the reported values are reasonable and should be accepted as valid data. This of course can be difficult if the analyst is unaquainted with the range variance of the data. Variances can be a function of unit type, mission, or even time of year. Usage data is cyclical. Normally, units perform large training exercises one month and perform vehicle maintenance the next. Also, in lean funding years, the majority of the dollars spent on repair parts by the unit are used in the first half of the fiscal year to avoid losing training opportunities. Units have been known to turn in repair parts for partial credit when money is needed. Familiarization with the data can only be realized upon repeated analyses.

A way to prove the validity of the data is through a record by record analysis of the reported values. If volume of the reported data is too great however, then an alternate method may have to suffice.

An easy way to find large variances in the data is to total both dollars and usage data by EIC code. An average usage/vehicle or an average dollars/vehicle for the reporting period can be calculated:

$$Avg_{Usage} = \text{Total Usage}_{EIC}/Density_{EIC} \quad \text{Eq. 5}$$

and,

$$Avg_{Dol} = \text{Total dollars}_{EIC}/Density_{EIC} \quad \text{Eq. 6}$$

where $Density_{EIC}$ is the total vehicles reporting for a particular EIC. These averages can be compared to previously reported averages as a cursory check for data validity. This of course is only cogent if the reporting periods are identical or prorated. Although not necessary, this screening method suggests an automated means of calculation.

Once averages are determined, they should be compared to previously reported values. If there exists significant deviation, then the analyst should review the raw data of the particular EIC causing the problem. Any errors found should be resolved at the unit level or the report records should be removed prior to data reduction.

Due to the design of the current Army supply system, the EIC code that can be placed on each requisition does not undergo an edit check to determine its accuracy. Therefore, not all dollars reported by TUFMIS and/or the CDDB are tagged with the proper EIC code. This can be a problem in determining weapon system cost factors. Although costs are incurred by weapon systems, they cannot be associated with those systems directly. This is due to either an operator input error, operator negligence, or the part could not be associated to any one weapon system because it is a common part.

These unassigned dollars should be spread across all weapon systems for that unit based upon usage rates for the month the costs were incurred and the current accepted cost factor. Although this method in accounting for unassigned dollars may be deemed arbitrary, it does attempt to place the dollars with the appropriate weapon system.

Cost Factor Computation

General

Once the raw report data has been analyzed and edited for conspicuous errors, it should be condensed or reduced for ease of calculation. An electronic spreadsheet can prove to be invaluable in the calculation of cost factors. Although the discussion will assume an electronic calculation vehicle, it can always be conducted using a manual spreadsheet.

To aid the discussion of cost factor computation, fictitious sample data is included for the months of January and February for 1/5 CAV, First Calvary Division. In this discussion, cost factors for the month of January will be calculated using a value of one month for the repair part maintenance lag, T_{Lag}.

Table I contains the raw January usage data for 1/5 CAV. The previous month, December, odometer and chronometer readings are subtracted from the current month readings, January, to produce total miles and hours used on each vehicle, see Table II. The usage data is totaled by EIC and condensed to produce total miles/hours incurred for the month of January, Table III, for each weapon system.

Table IV and Table V contain TUFMIS unit data for 1/5 CAV for the months of January and February respectively. Table VI and Table VII contain TUFMIS DS data for 1/5 CAV for the months of January and February respectively. Again, February unit and DS TUFMIS commitments are required, because the cost incurred by any weapon system lags behind the usage data by one month as previously given. This is important when allocating maintenance dollars that have no weapon system associated with them, EIC = '***'.

Unit Maintenance Dollars

Table VIII contains the summary usage data taken from Table III as well as the unit TUFMIS commitment dollars. The fifth column in this table contains the unassigned unit dollars for February taken from Table V under the EIC code of '***'. The formula for calculating Total Unit dollars is:

$$Unit_{Dollars} = \text{Assigned Dollars} + \text{Allocated Dollars} \qquad \text{Eq. 7}$$

Assigned dollars can be taken directly from the TUFMIS report. However, obtaining the allocated dollars in the above expression is more complex. The formula for allocating the unassigned dollars is:

$$(CF_{EIC} * Usage_{EIC}) / (\sum CF_{EIC} * Usage_{EIC}) * Dollars_{***} = Allocated\ Dollars_{EIC} \qquad \text{Eq. 8}$$

In the case of the M1,

$$(35 * 161)/(35*161 + 0.35*3026 + 390*71 + 0.25*30) * 245.12 = \$\ 40.16$$

Allocated February unassigned unit dollars can then be added to January dollars to obtain the total unit dollars required to maintain that particular weapon system for the reporting period. Using Eq. 7,

$$\$\ 5,436.68 = \$\ 5,396.52 + \$\ 40.16$$

This calculation should be performed for each weapon system in the unit. Computed total unit dollars in this example are found in the tenth column of Table VIII.

DS Maintenance Dollars

Table IX contains the summary usage data taken from Table III as well as the DS TUFMIS commitment dollars. The fifth column in this table contains the unassigned unit dollars for February copied from Table VII under the EIC code of '***'. The formula for calculating Total unit dollars is:

$$DS_{Dollars} = \text{Assigned Dollars} + \text{Allocated Dollars} \qquad \text{Eq. 9}$$

Assigned dollars can be taken directly from the TUFMIS report for the DS unit . Again, using Eq. 8 and continuing with the example of the M1 :

(5 * 161)/(5*161 + 0.05*3026 + 50*71 + 0.10*30) * 567.23
= $ 101.26

Allocated February unassigned DS dollars are then added to January dollars to obtain the total DS dollars required to maintain that particular weapon system by the DS unit. Using Eq. 9,

$ 985.81 = $ 884.55 + $ 101.26

Again, as with the unit dollars, this calculation must be performed for each weapon system in the unit. Computed total DS dollars are found in the tenth column of Table IX.

POL Dollars

Calculation of equipment POL dollars is straightforward. The gallons consumed by the weapon system is multiplied by the cost per gallon that the installation must pay for the fuel. This cost is normally constant for any fiscal year since all fuel is purchased from the Defense Fuel Supply Center (DFSC) at a given fixed rate. The formula is:

$$\text{Fuel Cost}_{EIC} = \text{Gallons}_{EIC} * \text{Fuel Cost} \qquad \text{Eq. 10}$$

Therefore, the M1 fuel cost for January is:

$ 61.00 = 100 Gal * .61/Gal (diesel)

Table X lists the fuel costs for the weapon systems in this example.

Equipment Cost Factor

Once the unit maintenance dollars, DS maintenance dollars, and fuel dollars have been computed, then the cost factor can be calculated for each weapon system. Using equations 1,2,3, and 4, the cost factor for the M1 for this example is:

$ 40.27 = $ 61/161 + $ 5,437/161 + $ 986/161

Cost factors for all systems in this example are listed in Table XI. It is important to calculate not only the total cost factor but also separate factors for unit level maintenance, DS level maintenance, and fuel. These separate factors are frequently used by various activities to conduct cost analyses at the installation.

Conclusions

Maintaining a good cost factor program at the installation requires program continuity, objective data analysis, an understanding of the data sources, and monthly data reviews. The generation of cost factors is not mathematically complex, but it requires intricate data screening to avoid incorporating inadvertent system or human errors that can inflate or deflate an accurate result.

When raw data errors are found, they must be resolved or omitted to prevent erroneous results. If repair part dollars are not assigned to any one weapon system, then they must be allocated throughout all systems of that unit to maintain some means of accountability. Although the method of allocation discussed is not precise by any means, it does attempt to apportion costs based on some empirical relationship.

Cost factors generated for any one period are dangerous to use for cost analysis in and of themselves. Factors can vary from month to month. Even when a report period of 6 months is used, the factors, when compared to another reporting period, can be significantly different. These variations are caused by the unit supply requisitioning process. Several months, preferably at least twelve, worth of data should be collected prior to calculating, publishing, and using the resultant factors.

Automating the usage data collection process can significantly improve the usage data report quality. Also, since the data is already in an automated system file, it can reduce the time required for data screening and the time required for cost factor calculation by reducing analyst data entry time. Fort Hood has seen at least a two fold improvement in report timeliness and data quality since the revised EUDCS system was fielded.

Recommendations

Listed below are recommendations to installations who want to improve their cost factor programs or who are wanting to implement a cost factor program.

a. Assign one analyst responsibility for cost factor data collection, data analysis, and reporting. There is no substitute for in-house expertise and continuity.

b. If TUFMIS commitments are used for repair part cost data, then the analyst should monitor the data monthly and provide feedback to the units as to the quality of their data.

c. Unassigned repair part dollars should be allocated across all weapon systems to insure cost accountability.

d. Implement an automated equipment usage data collection system, if possible.

e. Calculate and publish cost factors every fiscal year based on twelve or more months worth of data.

Listed below are recommendations that the Army could implement to improve data integrity and availability:

a. Provide a change package to the newly fielded Unit Level Logistics System (ULLS) that would automatically provide a usage report based upon oil sample analysis usage input.

b. Provide a change package to ULLS that would automatically assign the EIC based upon either the equipment bumper number or national stock number to avoid EIC input errors.

REFERENCES

[1] CACI, Inc., "Events Resourcing Model Draft End User Manual", 1989, written for U.S. Army.

[2] Col. T.A. Baucom, G3/PTM, III Corps, briefing presented at the 2nd Annual Fort Hood Career Day titled, "G3/PTM Mission", 30 March 1989.

[3] Department of the Army, "Tactical Unit Financial Management Information System (TUFMIS)", TM 38-C02-11, April 1987, p. 2-4.

[4] Management Consulting and Research, Inc., "Equipment Usage Data Collection System, Ver 2.0", March 1988.

[5] William F. Roberts, "Fort Hood Cost Factor Data Reporting Memorandum of Instruction (MOI)", April 1988.

[6] U.S. Army, "Army Materiel Maintenance Policy and Retail Maintenance Operations, AR 750-1", April 1988.

[7] FORSCOM, "Equipment Operating Cost and Usage Factors, FORSCOM Pamphlet 37-1", April 1988.

LIST OF ABBREVIATIONS

CDDB - Central Demand Database

DAS3 - Decentralized Automated Service Support System

DFSC - Defense Fuel Supply Center

DS - Direct Support

DS4 - Direct Support Unit Standard Supply System

DOL - The Directorate of Logistics

EIC - End Item Code

ERM - Events Resource Model

FMO - Financial Management Office

FORSCOM - U.S. Army Forces Command

LCA - Logistics Control Activity

MHE - Materiel Handling Equipment

PC - Personal Computer

POL - Petroleum, Oils, and Lubricants

POM - Program Objective Memorandum

STANFINS - Standard Army Financial System

TUFMIS - Tactical Unit Financial Management Information System

UIC - Unit Identification Code

ULLS - Unit Level Logistics System

WESDC - Weapon Systems Designator Code

Figure 1. Equipment Usage vs. Cost

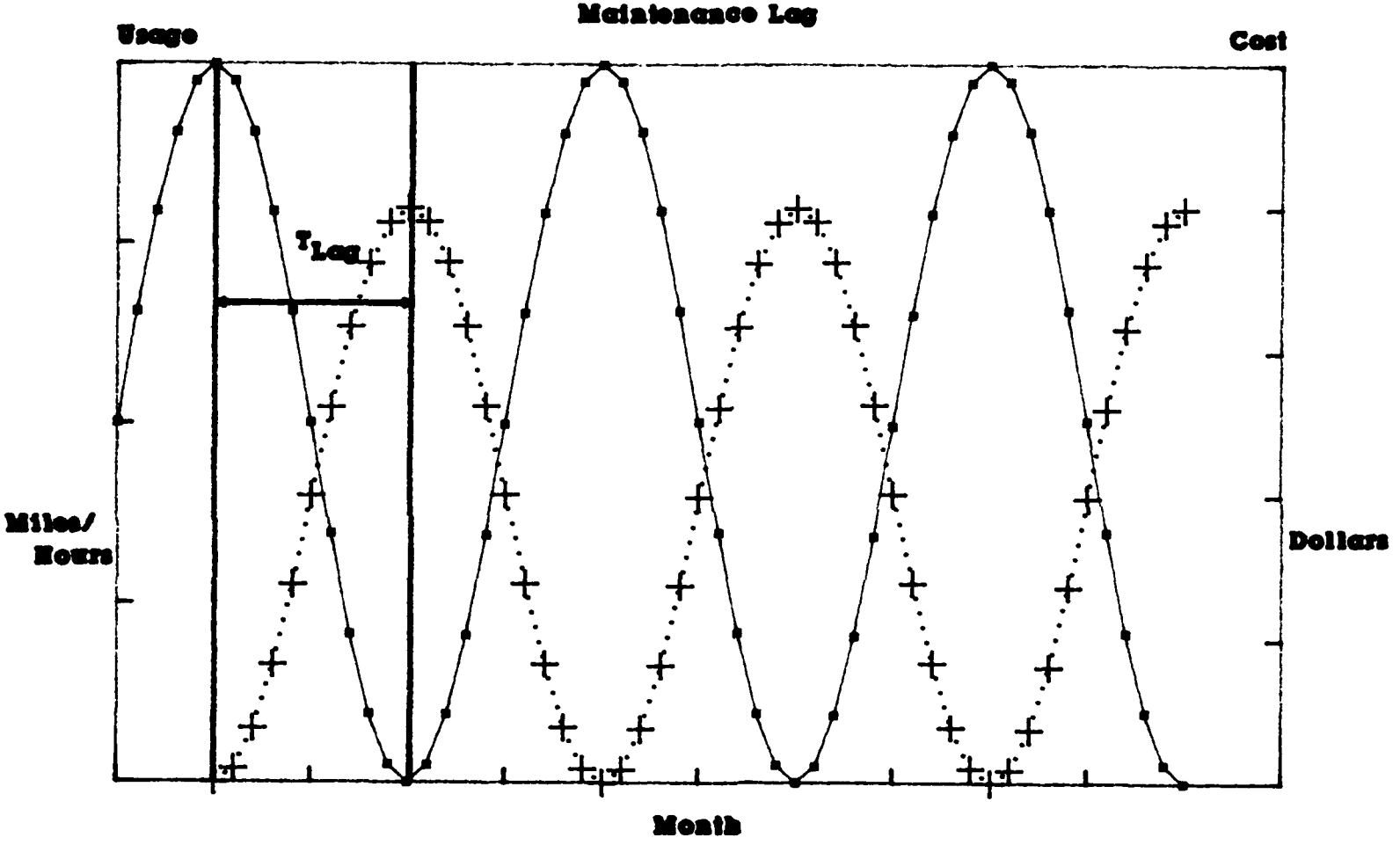

TABLE I - January Usage Data

UNIT : 1/5 CAV UIC : WAGLAA
MONTH : JAN

EIC	BUMPER NUMBER	MODEL	DEC MILES	JAN MILES	DEC HOURS	JAN HOURS	FUEL	FUEL TYPE *
AAA	A-1	M1	1,256	1,312	512	543	70	D
AAA	A-2	M1	1,398	1,405	389	391	5	D
AAA	A-3	M1	10	108	234	245	25	D
BBD	B-1	M998	12,456	13,124	-	-	70	D
BBD	B-2	M998	13,879	14,234	-	-	38	D
BBD	B-3	M998	543	1,523	-	-	95	D
BBD	B-4	M998	5,289	6,312	-	-	121	D
RHA	23456	AH-64A	-	-	1,033	1,053	3,222	4
RHA	23457	AH-64A	-	-	970	1,000	4,755	4
RHA	23458	AH-64A	-	-	542	563	3,405	4
VCN	C-101	PU-405	-	-	1,002	1,032	310	D
VCN	C-102	PU-405	-	-	789	789	0	D

* NOTE: D= Diesel, 4 = JP4, U = Unleaded.

TABLE II - January Usage Data

UNIT : 1/5 CAV UIC : WAGLAA
MONTH : JAN

EIC	BUMPER NUMBER	MODEL	JAN MILES	JAN HOURS	FUEL	FUEL TYPE *
AAA	A-1	M1	56	31	70	D
AAA	A-2	M1	7	2	5	D
AAA	A-3	M1	98	11	25	D
BBD	B-1	M998	668	0	70	D
BBD	B-2	M998	355	0	38	D
BBD	B-3	M998	980	0	95	D
BBD	B-4	M998	1,023	0	121	D
RHA	23456	AH-64A	0	20	3,222	4
RHA	23457	AH-64A	0	30	4,755	4
RHA	23458	AH-64A	0	21	3,405	4
VCN	C-101	PU-405	0	30	310	D
VCN	C-102	PU-405	0	0	0	D

* NOTE: D= Diesel, 4 = JP4, U = Unleaded.

TABLE III - January Summary Usage Data

UNIT : 1/5 CAV UIC : WAGLAA
MONTH : FEB

EIC	MODEL	DENSITY	TOTAL MILES	TOTAL HOURS	FUEL	FUEL TYPE
AAA	M1	3	161	44	100	D
BBD	M998	4	3,026	-	324	D
RHA	AH-64A	3	-	71	11,382	4
VCN	PU-405	2	-	30	310	D

* NOTE: D= Diesel, 4 = JP4, U = Unleaded.

TABLE IV - January Unit TUFMIS AVE-52A Report

PREPARED 29 JAN 89 TACTICAL UNIT FINANCIAL MGT INFO SYS (TUFMIS) PCN AVE-52A

WEAPON SYSTEM COST REPORT

1/5 CAV UIC AGL

EIC	COMMITMENTS	CREDITS	EIC TOTAL
AAA	5,450.00	53.48 -	5,396.52
BBD	1,234.56	0.00	1,234.56
RHA	19,245.67	145.45 -	19,100.22
VCN	12.46	0.00	12.46
***	123.66	0.00	123.66
BATTALION TOTALS	26,066.35	198.93 -	25,867.42

TABLE V - February Unit TUFMIS AVE-52A Report

PREPARED 1 MAR 89 TACTICAL UNIT FINANCIAL MGT INFO SYS (TUFMIS) PCN AVE-52A

WEAPON SYSTEM COST REPORT

1/5 CAV UIC AGL

EIC	COMMITMENTS	CREDITS	EIC TOTAL
AAA	2,202.50	112.20 -	2,090.30
BBD	702.10	10.12 -	691.98
RHA	6,923.45	0.00	6,923.45
VCN	52.34	0.12 -	52.22
***	245.12	0.00	245.12
BATTALION TOTALS	10,125.51	122.44 -	10,003.07

TABLE VI - January DS TUFMIS AVE-52A Report

PREPARED 29 JAN 89 TACTICAL UNIT FINANCIAL MGT INFO SYS (TUFMIS) PCN AVE-52A

WEAPON SYSTEM COST REPORT

EIC	DSU COMMITMENTS	UIC DSU CREDITS	EIC TOTAL
AAA	908.00	23.45 -	884.55
BBD	152.40	0.00	152.40
RHA	3,412.00	210.90 -	3,201.10
VCN	5.98	0.10 -	5.88
***	56.12	0.00	56.12
BATTALION TOTALS	4,534.50	234.45 -	4,300.05

TABLE VII - February DS TUFMIS AVE-52A Report

PREPARED 1 MAR 89 TACTICAL UNIT FINANCIAL MGT INFO SYS (TUFMIS) PCN AVE-52A

WEAPON SYSTEM COST REPORT

EIC	DSU COMMITMENTS	UIC DSU CREDITS	EIC TOTAL
AAA	1,089.20	2.99 -	1,086.21
BBD	516.23	0.00	516.23
RHA	4,652.67	0.00	4,652.67
VCN	3.12	0.12 -	3.00
***	567.23	0.00	567.23
BATTALION TOTALS	6,828.45	3.11 -	6,825.34

TABLE VIII - January Unit Cost Factor Calculation Sheet

1/5 CAV UIC : WAGLAA
JAN

EIC	MODEL	USAGE	UNIT DOLLARS	FEB UNASSIGNED DOLLARS	CURRENT UNIT CF	ALLOCATION FACTOR	WEIGHT	ALLOCATED UNASSIGNED DOLLARS	TOTAL UNIT DOLLARS
AAA	M1	161	5,396.52	245.12	35.00	5,635.00	0.1638	40.16	5,436.68
BBD	M998	3,026	1,234.56	245.12	0.35	1,059.10	0.0308	7.55	1,242.11
RHA	AH-64A	71	19,100.22	245.12	390.00	27,690.00	0.8051	197.36	19,297.58
VCN	PU-405	30	12.46	245.12	0.25	7.50	0.0002	0.05	12.51
TOTALS		3,288	25,743.76			34,391.60		245.12	25,988.88

TABLE IX - January DS Cost Factor Calculation Sheet

1/5 CAV UIC : WAGLAA
JAN

EIC	MODEL	USAGE	DS DOLLARS	FEB UNASSIGNED DOLLARS	CURRENT DS CF	ALLOCATION FACTOR	WEIGHT	ALLOCATED UNASSIGNED DOLLARS	TOTAL DS DOLLARS
AAA	M1	161	884.55	567.23	5.00	805.00	0.1785	101.26	985.81
BBD	M998	3,026	152.40	567.23	0.05	151.30	0.033[illegible]	19.03	171.43
RHA	AH-64A	71	3,201.10	567.23	50.00	3,550.00	0.7873	446.56	3,647.66
VCN	PU-405	30	5.88	567.23	0.10	3.00	0.0007	0.38	6.26
TOTALS		3,288	4,243.93			4,509.30		567.23	4,811.16

TABLE X - January Fuel Cost Factor Calculation Sheet

1/5 C V UIC : WAGLAA
JAN

EIC	MODEL	USAGE	FUEL TYPE *	FUEL	FUEL COST/GAL	FUEL COST
AAA	M1	161	D	100	0.61	61.00
BBD	M998	3,026	D	324	0.61	197.64
RHA	AH-64A	71	4	11,382	0.65	7,398.30
VCN	PU-405	30	D	310	0.61	189.10
TOTALS		3,288		12,116		7,846.04

* NOTE: D= Diesel, 4 = JP4, U = Unleaded.

TABLE XI - January Cost Factor Summary Sheet

1/5 CAV UIC : WAGLAA
JAN

EIC	TYPE	USAGE	DENSITY	FUEL TYPE	FUEL	FUEL COST	UNIT LEVEL DOLLARS	DS LEVEL DOLLARS	POL CF	UNIT CF	DS CF	TOTAL CF
AAA	M1	161	3	D	100	61	5,437	986	0.38	33.77	6.12	40.27
BBD	M998	3,026	4	D	324	198	1,242	171	0.07	0.41	0.06	0.53
RHA	AH-6	71	3	4	11,382	7,398	19,298	3,648	104.20	271.80	51.38	427.37
VCN	PU-4	30	2	D	310	189	13	6	6.30	0.42	0.21	6.93
		3,288	12		12,116	7,846	25,989	4,811				